MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

ENVIRONMENTAL ASSESSMENT OF THE ROTENONE TREATMENT OF RANDALL CREEK AND ASSOCIATED PONDS FOR REMOVAL OF NORTHERN PIKE

PART 1. PROPOSED ACTION DESCRIPTION

A: Type of Proposed Action: Randall Creek and four associated ponds in the project area (T1N R3E S12) cover approximately 9 acres when in a drawn down state. The ponds are on private ground and are used for private recreational purposes. The fish species currently present are northern pike, rainbow trout, brown trout, white suckers, mountain suckers and fathead minnows. The northern pike are an unauthorized population of unknown origin. If these fish escape to public water or are illegally transplanted elsewhere, they may establish other self-sustaining populations. Northern pike are predators. They are not native to the upper Missouri River drainage and pose a threat to its wild trout and native game and non-game fish populations through predation on those fish. Mechanically removing northern pike from the ponds and flowing waters has been attempted and proven ineffective in eliminating pike from the system. Although this project will take place on private property, the public's interest will be served by the removal of these pike. Therefore, Montana Fish, Wildlife & Parks (MFWP) is proposing to treat these ponds along with Randall Creek and associated ditches with the fish toxicant rotenone. The intent of the rotenone treatment is to remove all fish and allow subsequent restocking of the ponds with either rainbow or westslope cutthroat trout under private pond licensing laws.

A. Project Goal: Elimination of the northern pike population in Randall Creek and associated ponds and ditches and successful conversion of said ponds to rainbow or westslope cutthroat trout.

Project Phase	Expected Completion Date
Phase 1. Repair of inlet and outlet structures on ponds to conform to private pond licensing requirements	Nov/07
Phase 2. Obtain and summarize data and complete Environmental Assessment for rotenone treatment of the pond and flowing waters	Jan/08
Public comment period for EA	Jan/08
Obtain necessary permits for rotenone treatment	Jan/08
Phase 3. Draw down ponds and treat ponds and flowing waters with rotenone	Feb/08-April/08
Phase 4. Process private pond applications	When received from landowners

Phase 5. Monitor success of rotenone treatment	Spring 2008
Phase 6. Restock ponds with approved fish species	At landowner discretion
Phase 7. Continued monitoring of rotenone treatment success through landowner contact	2008-2009

B. Agency Authority for the Proposed Action: The Montana Fish, Wildlife & Parks (MFWP) "…is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects…" under statute 87-1-702. Montana Code Annotated also allows " application of a pesticide that is registered by the United States environmental protection agency pursuant to 7 U.S.C. 136(a) when it is used to control nuisance aquatic organisms or to eliminate undesirable and nonnative aquatic species" under statute 75-5-308.

C. Estimated Commencement Date: Winter 2008.
Estimated Completion Date: Spring 2008.

D. Name and Location of the Project: Rotenone treatment of Randall Creek and associated ponds for removal of northern pike. Location: T1S R3E S 12, Gallatin County, east of Manhattan.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open Space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – ~9 acres of ponds
5. Floodplain – ~2.0 miles of stream will be treated
6. Irrigated Cropland - 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres
10. Other – 0 acres

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action.

1. **<u>Summary of the Proposed Action</u>**:

Northern pike are large, prolific predators. They have the potential to alter both wild trout and native game and non-game fish populations by predation. The occurrence of northern pike from an unknown location in Gallatin County was first mentioned in MFWP's Illegal Introductions Database in 1996. By 2003, several northern pike had been reported in various flowing waters of the Gallatin River Drainage, and a probable source of these fish was located in the Randall Creek area ponds. Subsequent sampling of this system confirmed a reproducing population of northern pike with multiple age classes present. It became apparent after numerous gillnetting attempts in

2006 and 2007 that total removal of this population by mechanical means would be difficult or impossible. Because of the unsuccessful efforts of mechanical removal in the past, MFWP is proposing to treat Randall Creek and associated ponds and ditches with a commercial formulation of rotenone to remove northern pike from the system.

2. Purpose and Need for the Proposed Action:

The purpose of this proposed action is to remove a reproducing population of northern pike from a location outside their native range. Northern pike are known to impact other fish species negatively, in many cases where they have been introduced. This particular location in Gallatin County is the only known reproducing population in the Missouri River drainage upstream of Three Forks. Failure to control this source of pike could result in escapement of fish into the drainage with a possibility of further reproduction and attendant impacts to other fishes. The lower Madison River had 51,737 angler days of fishing in 2005 while the lower Gallatin River had 52,680 angler days. Northern pike could have a devastating effect on these areas because trout are an abundant food source.

3. Proposed Activities

MFWP would use a commercial formulation of the piscicide rotenone (that contains 5% rotenone as the active ingredient) for this project to remove northern pike. If needed, a second rotenone application would occur in either the spring or fall of 2008.

MFWP has a long history of using rotenone to manage fish populations in Montana. From 1948 through present, MFWP has completed over 130 rotenone projects for a variety of reasons but principally to improve angling quality and less often for native fish conservation.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family including jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, Oceania, southern Asia, and South America. Native people have used rotenone for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930's. Rotenone has also been used as a natural insecticide for gardening and to control ectoparasites such as lice on domestic livestock.

Rotenone acts on fish by inhibiting oxygen transfer at the cellular level and is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals and other nongill-breathing organisms do not have this rapid route into the bloodstream and thus can tolerate exposure to concentrations much higher than those used to kill fish. In essence, most nontarget organisms are not impacted at fish-killing concentrations although aquatic crustacean, insect, and zooplankton numbers are drastically reduced during the first year following the application of the piscicide rotenone. Recovery occurs in 1 to 2 years. The concentrations used to kill fish are low, usually 1 ppm (parts per million or one part rotenone solution to 1,000,000 parts water). Because of the low concentration of rotenone in the water, there is very little risk to human or animal health. At this concentration, a person would have to drink 23,000 gallons of water at one time to have an effect

(American Fisheries Society Publication). Rotenone is not readily absorbed through the stomachs of vertebrates or other animals, so there is little risk to wildlife that consume treated waters or consume fish killed by rotenone. Rotenone does not affect aquatic plants at fish-killing concentrations. Rotenone also degrades readily in the environment, the rate of which depends on water temperature, alkalinity, amount of sunlight and other factors, but rarely does it persist for more than a few weeks. Rotenone also readily binds to soil particles where it is naturally broken down, so the risk of contaminating ground water supplies is minimal. Studies conducted adjacent to rotenone-treated waters failed to show the presence of the chemical in the ground water. All surface water leaving the project area will be quickly neutralized using potassium permanganate ($KMnO_4$).

All label requirements for rotenone application to ponds and streams will be followed along with the regulations set forth by the Montana Department of Agriculture. Only certified applicators and trained operators will be allowed to assist in the chemical treatment of waters in the project area.

Approximately two miles of Randall Creek and associated ditches and the four ponds in the project area would be treated with 5% rotenone. We would follow the manufacturer's label recommendations for concentrations for normal lake use when treating the ponds which, for northern pike, is up to 1 ppm. Concentrations would not exceed those on the manufacturer's product labels. The manufacturer's label states that the persistence of the rotenone varies according to water temperatures, turbidity, sunlight intensity, alkalinity, etc. However, we believe the lake would be detoxified in approximately 6-12 weeks. MFWP has many case studies that show rates of natural detoxification. Blue Lake near Stryker treated in 2006 with 1.5 ppm detoxified in 77 days. Martin Lakes near Olney treated in 2005 with 1.17 ppm was detoxified in 44 days. In Martin Creek in 2005, the stream detoxified within 48 hours. Without detoxifying, rotenone will be reduced to non-toxic levels in one to several days in streams due to its degradation and dilution in the aquatic environment.

Although there is no domestic use of water from Randall Creek and the ponds, signs would be posted to warn people not to drink the water or to swim immediately after the application of rotenone.

The rotenone would be dispensed in the ponds by boat. Drip stations are containers which hold a measured amount of rotenone to provide the desired instream concentration, then filled with water to provide dilution and the proper delivery time to the target stream. Those and backpack sprayers will be used to dispense the rotenone in inlet channels to the lakes, outlet streams, marshy areas around the lake, and within Randall Creek and associated ditches downstream to an existing fish barrier. We would use an auger system to apply dry potassium permanganate to detoxify Randall Creek near the fish barrier if freezing conditions are encountered. Otherwise, a liquid formulation will be used. Randall Creek discharge will be gauged and flow rates determined using Fluorescein dye and U.S. Geological Survey streamflow measurement protocol prior to treatment to allow calculation and dispensing of proper amounts of chemical.

The duration of the application to any particular pond or stream reach would take approximately 8 hours; however, treated water would be flowing in Randall Creek for an extended period of

time. We would operate the detoxification station near the existing fish barrier until sentinel fish survive and show no signs of stress in the creek for 24 hours as specified by the label.

After the first rotenone treatment we will evaluate the effectiveness of the treatment via gillnetting and electrofishing surveys and use the information gathered from these surveys to evaluate the need for an additional treatment. If fish are captured and a second treatment is required, we would likely complete the second treatment in Spring of 2008.

G. Other Local, State or Federal agencies with overlapping jurisdiction.

Montana Department of Agriculture
Montana Department of Environmental Quality

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. WATER Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?			X		YES	2d
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?			X		YES	2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	see2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		YES	2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		YES	see 2a

Comment 2a. Alteration of surface water quality: Rotenone is commonly used in agriculture and home gardening as well as being an effective fish toxicant. It is relatively inexpensive, compared to other piscicides, and has been routinely used in lake, pond, and stream rehabilitation. Rotenone acts by blocking the ability of tissues to use oxygen. Fish quickly asphyxiate in the presence of fish-killing concentrations of rotenone. Rotenone is not a carcinogen, although the carcinogen TCE (trichloroethylene) is a component of some formulations of rotenone. Rotenone has a half-life of 14 hours at 24^{o}C and 84 hours at 0^{o}C; meaning that half of the rotenone is degraded and is no longer toxic in that time. Increases in temperature and sunlight both speed the rate that rotenone degrades. Higher alkalinity (>170 ppm) and pH (>9.0) also increase the rate of degradation. Rotenone tends to bind and react with

organic molecules rendering it ineffective, so higher concentrations are required in streams and lakes with increased amounts of organic debris. Without detoxification, rotenone will be reduced to non-toxic levels in one to several days in streams due to its degradation and dilution in the aquatic environment and 6-12 weeks in lakes.

Potassium permanganate (KMnO4), which quickly detoxifies rotenone, will be present on site and used at the point where Randall Creek leaves the project area at the fish barrier. KMnO4, when administered at similar concentrations as rotenone, quickly breaks rotenone down into non-toxic byproducts. Rotenone is safe to use for chemical removal of unwanted fish species. Rotenone has been approved for use in fish removal by the Montana Department of Environmental Quality and the U.S. Environmental protection Agency, and represents no threat to humans at concentrations that are used to kill fish.

Dead fish will be allowed to naturally decompose on site. As fish decompose, there may be a temporary increase in the availability of nutrients in the water. This increase should not present a problem for water quality downstream as nutrients will be diluted and short lived. Further, aquatic macrophytes will likely benefit from the increased nutrient levels and act to temporarily store nutrients.

Comment 2d: Changes in the amount of surface water: One of the four ponds can be drawn down prior to treatment to minimize the amount of rotenone needed for treatment. It will be refilled to full pool prior to restocking.

Comment 2f: Changes in groundwater quality: The risk that rotenone will enter and be mobile in groundwater is minimal because it has a strong tendency to adsorb to sediment. Once bound to organic molecules, it becomes inert and breaks down quickly in the environment without detoxification. Groundwater tests in areas adjacent to rotenone-treated waters in California did not show evidence of the chemical moving into groundwater supplies (Finlayson et.al. 2000). Furthermore, the chance for groundwater contamination would be minimal because the project area is in an area of spring seeps indicating that groundwater is not being recharged but is discharging. The mud and organically enriched bottom of the ponds will also bind with and inactivate the rotenone before it can interact with groundwater.

Comment 2h: See 2f.

Comment 2j: Effects on other water users: Because of label precautions against humans or domestic animals drinking treated water or consuming dead fish, the landowners may restrict public access to the ponds or to the creek during treatment.

Comment 2m: See 2a.

3. AIR Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))		X				
b. Creation of objectionable odors?			X		Yes	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge, which will conflict with federal or state air quality regulations?		X				

Comment 3b. Certain rotenone products produce objectionable odors because of petroleum-based carriers (naphthalene) in the product and not the active ingredient (rotenone). These odors should be strongest around the ponds. Odors will not likely persist more than 2 weeks following treatment (Finlayson et al. 2000). Applicators will be protected by using respirators as required by the Montana Department of Agriculture and the product label. There is an inhalation risk when using KMnO4. Respirators will be used when handling this material.

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X		YES	4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Rotenone does not affect plants at fish-killing concentrations, so there will be no effect of rotenone application on the aquatic and riparian plant communities. A short-term increase in aquatic plant production may occur due to nutrients released by decaying fish.

5. FISH/WILDLIFE Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		YES	5b
c. Changes in the diversity or abundance of nongame species?			X		NO	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: The objective of this project is to eradicate unwanted northern pike (a game species) from Randall Creek and the four ponds in the project area. It is expected that either rainbow or westslope cutthroat trout will be stocked into the four ponds when treatment is complete and valid private pond licenses are obtained. Rainbow and brown trout are a non-native fish to the Gallatin Valley in Montana but are a desirable fish species at the present time. Rainbow and brown trout should quickly recolonize Randall Creek from upstream following treatment.

Waterfowl are known to frequent the project area regularly during migration seasons, and some should be assumed to breed in the area. These birds feed on aquatic plants and animals in the reservoir. Increased presence of humans at the site during treatment will temporarily displace waterfowl. This will be a short term and minor impact. Birds are not affected by drinking water or eating insects killed by rotenone at fish-killing concentrations. The temporary reduction in invertebrates as a result of a rotenone treatment may affect invertebrate-eating waterfowl. These impacts should be minimal as there is abundant surface water in the surrounding country, and invertebrate populations have been shown to rebound quickly following treatment.

Comment 5c: Non-target fish species in this project are white suckers and mountain suckers, both native non-game fish, and fathead minnows which are a non-game fish native to eastern Montana but probably not the Gallatin Valley. These species are very abundant in streams and reservoirs in Gallatin and surrounding counties. White suckers are not a desirable fish species for ponds as they can overpopulate, compete with more desirable game species, and cause muddy water which limits aquatic productivity. Fathead minnows are not an undesirable species in these ponds because of their small size and potential as a prey fish for salmonids. The impacts to these non-game species cannot be mitigated in the ponds except through their reintroduction following treatment. Reintroduction is not anticipated. These species should be expected to recolonize Randall Creek quickly from populations found upstream from the project area. The other non-game species that will be affected by this project are the aquatic invertebrates in the creek and ponds. Because rotenone is an insecticide, it will have impacts on invertebrates. The predicted effect is a temporary decrease in some invertebrate populations (Bramblett 1998). There is no effect on birds or mammals that are directly exposed to rotenone, by drinking treated water, or by eating fish killed by fish toxicants (Schnick 1974). Amphibian adults are not affected by rotenone at the proposed concentrations (Bramblett 1998), but sub-adults may be affected. Because we anticipate treating the pond in the winter or early spring, juvenile amphibians will not likely be present; therefore, impacts to amphibians should be minimal.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?		X				
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

7. LAND USE Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

8. RISK/HEALTH HAZARDS Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?		X				
c. Creation of any human health hazard or potential hazard?			X		YES	see 8a
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: Most brands of rotenone solution come in concentrations of 1 to 5% rotenone. Thus, at an application rate of 1-2 ppm rotenone solution, the actual concentration of rotenone in the water is approximately 0.025-0.050 ppm (California Department of Fish and Game 1994). The hazard associated with the short-term exposure to drinking water containing rotenone is very small because of the low concentration of rotenone used in the treatment and the rapid breakdown and dilution of rotenone. Estimates of a single lethal dose to humans are 300-500 mg of rotenone per kilogram (2.2 pounds) of body weight. For example, a 160-pound (72.6 kilogram) person would have to drink over 23,000 gallons (87,000 liters) of water treated at 0.25 mg of rotenone per liter of water at one sitting; 0.25 mg of rotenone per liter of water is the highest allowable treatment rate for fish management. A 22-pound (10 kilogram) child would have to drink over 1,429 gallons (5,400 liters). An intake of 0.7 mg of rotenone per kilogram of body weight per day is considered safe (Haley 1978) which is equivalent to about 25 mg per liter when consumed as drinking water. This concentration is far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water or our proposed concentration of 0.1 – 0.2 mg per liter.

With respect to long-term exposure to rotenone, there is probably no significant risk to humans because of the low concentrations at which it is applied (100 ug/L) and the fact that it degrades so quickly. The EPA (1997) has determined that the safe level for chronic (lifetime) exposure to rotenone is 4 ug/L. If we assume that rotenone in our treatment has a half-life of 10 days, then it will take 50 days for the concentration to drop below 4 ug/L. Exposure to hazardous concentrations of rotenone for 50 days is a far shorter period of time than the EPA says is necessary to elicit chronic effects.

Because the creek and ponds will be closed to the public during chemical treatment, the risk of human exposure will be most apparent for the applicators of the rotenone. Rotenone is a restricted-use pesticide which the Montana Department of Agriculture regulates through its licensing process. A certified applicator that has successfully met the state requirements for their license will supervise the application of rotenone to the creek and ponds. All who assist in the project will also be trained on the safe handling and application of the piscicide. Materials will be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill.

The expected concentration of potassium permanganate ($KMnO_4$) that will be required to neutralize rotenone will be 2 to 4 mg/L. The EPA believes the chronic toxicity of $KMnO_4$ breakdown products to be of no health concern based on the fact that they are naturally occurring and common in surface waters. The safety of $KMnO_4$ is further demonstrated by the fact that it is routinely used in drinking water treatment to achieve oxidation of iron, oxidation of taste and odor compounds, and control of nuisance organisms such as bacteria and viruses (USEPA 1999).

9. COMMUNITY IMPACT **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _____		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources			X		YES	10e
f. Define projected maintenance costs		X				

Comment 10e: FWP possesses the rotenone and equipment necessary for this application so other than personnel time there will be no additional cost associated with the treatment.

11. AESTHETICS/RECREATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)		X				
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

12. CULTURAL/HISTORICAL RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE Will the proposed action, considered as a whole:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?			X			13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X		YES	see 13e
g. List any federal or state permits required.			X			13g

Comment 13e: Limited concern is expected because the outlets to the ponds will be closed and the rotenone in the treated waters will be neutralized or degraded prior to flowing downstream. All landowners adjacent to and downstream of the project on Randall Creek will be made aware of the project and will receive a copy of this EA. This project should receive support as it will benefit the existing sport fishery in the area by preventing pike from spreading to public waters.

Comment 13g: The following permit will be required:

Fish toxicant permit:
DEQ 308 - Department of Environmental Quality (authorization for use of a fish toxicant)

PART III. ALTERNATIVES

Three alternatives were considered during preparation of the Environmental Assessment.

Alternative 1 - No Action.

The predicted consequence of the "No Action" alternative is that the reproducing northern pike population in the project area would continue to threaten wild trout populations in the upper Missouri River Drainage. Some pike can be expected to escape to wild trout waters where they may potentially establish other reproducing populations with probable negative impacts to wild game and non-game fish.

Alternative 2 – Mechanical Removal

This alternative has the same goal as the Proposed Action except that rotenone would not be used. Rather, removal of fish would be by mechanical means only, including both electrofishing and netting. Electrofishing is inefficient at removing all fish, particularly small fish, and electrofishing is generally not effective in water deeper than 6 ft, thus complete removal of fish would be impossible using electrofishing. Gill and trap netting in the past has been effective at reducing the numbers of adult and sub-adult northern pike. However, netting is ineffective at capturing juvenile fish. Thus, within a few years of netting, the northern pike population would rebound to previous levels. Using a combination of electrofishing and netting would likely produce the most effective results, but it is probable that 100% removal of the northern pike population would be impossible. Therefore, suppression would require repeated removal efforts to maintain the northern pike population at low levels. This would require a considerable investment of time and resources by MFWP over the years and it is more costly in the long run than chemical treatment. Further, the landowners would like an expeditious end point to this project.

Alternative 3 - Proposed Action

The proposed action includes treating Randall Creek, associated ditches, and ponds with rotenone to remove a non-native population of northern pike. Because rotenone has been demonstrated to be 100% effective when proper techniques are used, it is anticipated that the

treatment will result in the complete removal of northern pike from the project area. This will protect the areas public wild fisheries from a dangerous threat.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? No

This environmental review demonstrates that the impacts of this proposed project are not significant. The proposed action would benefit wild fisheries in the upper Missouri River Drainage and permit a valuable recreational fishery for the landowners with minimal impact on the physical, biological, or the human environment.

B) Public Involvement.

The EA will be posted on the FWP website during the comment period. Neighboring landowners will be contacted. A public meeting will be held if necessary.

C) Duration of the comment period?
Public comment will be accepted from January 16, 2008 through February 6, 2008.

D) Name, title, address and telephone number of the Person Responsible for Preparing the EA Document.

Mike Vaughn, Regional Fisheries Biologist Montana Fish, Wildlife and Parks 1400 S. 19th Bozeman, MT 59718 (406) 994-6938	Bruce Rich, Regional Fisheries Manager Montana Fish, Wildlife and Parks 1400 S. 19th Bozeman, MT 59718 (406) 994-3155

References

American Fisheries Society. Better fishing through management, how rotenone is used to help manage our fisheries more effectively. www.fisheries.org/rotenone/rotenonebroweb.pdf

California Department of Fish and Game. 1994. An assessment of the use of chemical fish toxicants in California. Inland Fisheries Administrative Report No. 83-2.

Bramblett, R. G. 1998. Environmental Assessment, Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program: Cherry Creek Native Fish Introduction. Report prepared for Montana Fish, Wildlife and Parks, Region 3, Bozeman, MT. 65 pp.

Finlayson, B. J., R. A. Schnick, R. L. Cailteux, L. DeMong, W. D. Horton, W. McClay, C. W. Thompson, and G. J. Tichacek. 2000. Rotenone use in fisheries management:

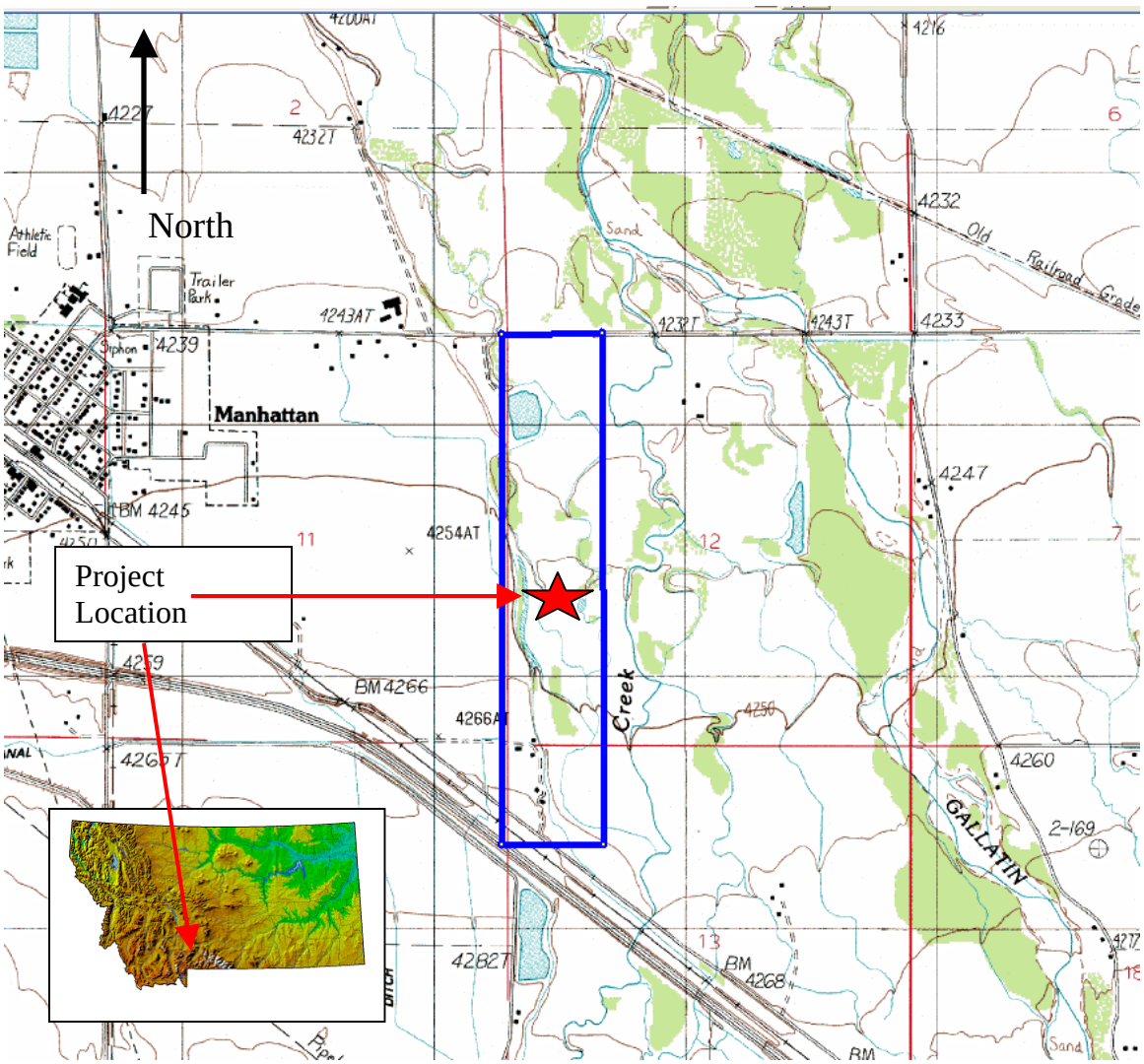
administrative and technical guidelines manual. American Fisheries Society, Bethesda, Maryland.

Finlayson, B.; Siepmann, S.; Trumbo, J. 2001: Chemical residues in surface and ground waters following rotenone application to California lakes and streams. Pp. 37–54 in Cailteux, R.L.R.;DeMong, L.; Finlayson, B.; Horton, W.; McClay, W.; Schnick, R.; Thompson, C. (eds)Rotenone in fisheries: are the rewards worth the risks? American Fisheries Society, Trends inFisheries Science and Management 1, Bethesda, Maryland.

Schnick, R. A. 1974. A review on the literature on the use of antimycin A in fisheries. USDI, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. Fish Control Laboratory, La Crosse, Wisconsin. NTIS PB-235 454/AS.

USEPA (U.S. Environmental Protection Agency). 1999. EPA Guidance Manual: Alternative Disinfectants and Oxidants, Chapter 5 Potassium Permanganate. April 1999

Randall Creek and Associated Ponds Project Vicinity Map



Appendix 1

Chapter 5 from

Rotenone Use in Fisheries Management
Administrative and Technical Guidelines Manual

Finlayson et al. 2000

5. ISSUES AND RESPONSES

This section was written with the lay (nontechnical) public in mind with minimal use of technical terminology. It includes its own references for reproduction and distribution to the public independent of the remainder of the manual. The Fish Management Chemicals Subcommittee intends to update this information annually for access on the American Fisheries Society Web site.

5.1 GENERAL INFORMATION

Q. What is rotenone?
A. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family Leguminosae including jewel vine *Derris* spp. and lacepod *Lonchocarpus* spp. Rotenone is very insoluble in water, and other materials can be added to disperse it throughout the water column in deep lakes and flowing waters. Rotenone is used either as a powder from ground-up plant roots (e.g., Pro-Noxfish®) or extracted from the roots and formulated as a liquid (e.g., Nusyn-Noxfish® and Noxfish®). The liquid formulations contain dispersants and emulsifiers (primarily naphthalene, methylnaphthalenes, and xylenes) that add little, if any, toxicity but disperse the rotenone throughout the water.

Q. How does rotenone work?
A. Rotenone does not suffocate fish or interfere with the uptake of oxygen in the blood as was long believed. Instead, it inhibits a biochemical process at the cellular level making it impossible for fish to use the oxygen absorbed in the blood and needed in the release of energy during respiration (Oberg 1967a, 1967b).

Q. Why is rotenone used in fish management?
A. Use of rotenone enables fisheries managers to eradicate entire populations and communities of fishes with minimum impact to nontarget wildlife. Following treatment, the desired population of fish is then reestablished in the water body. Although other approaches are useful as control measures, these are only partially effective in eradicating fish. Use of rotenone is the only sampling method that allows for an accurate estimation of standing crop (biomass of a population) of diverse fishes in large water bodies.

Q. Is rotenone a selective pesticide?
A. Although rotenone has some toxicity to all oxygen-breathing animals, it is selective to fish and other gill-breathing organisms at the concentrations used by fish biologists. In general, most common aquatic invertebrates are less sensitive than fish to rotenone. Some of the zooplankton (cladocerans and copepods) are equally sensitive; however, these do have life history stages that can survive the treatment. Snails and clams are quite tolerant. Shad, pike, trout, and salmon are among the most sensitive fish. Sunfish are less sensitive, and catfish are among the most tolerant (Marking and Bills 1976; Chandler and Marking 1982).

5.2 PUBLIC HEALTH

Q. Are there any public health effects from the use of rotenone?
A. Millions of dollars have been spent on research to determine the safety of rotenone before approval of use from the U.S. Environmental Protection Agency (USEPA). Much of this research has been directed toward potential effects on public health. This research has established that rotenone does not cause birth defects (Hazleton Raltech Laboratories 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutations (Biotech Research 1981; Goethem et al. 1981; NAS 1983), or cancer (USEPA 1981b; Tisdel 1985). When used according to label instructions for the control of fish, rotenone poses little, if any, hazard to public health. The USEPA (1981b, 1989b) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment.

Q. What is a lifetime safe exposure level for rotenone?
A. The National Academy of Science (NAS 1983) has suggested a Suggested No-Adverse Response Level (SNARL) for rotenone in drinking water of 0.014 milligrams (mg) rotenone per liter of water (14 parts per billion [ppb]). The California Department of Health Services (memorandum from P. Berteau, California Department of Health Services, to B. Finlayson, California Department of Fish and Game, 26 June 1984) has suggested an Action Level (level of concern) for rotenone in drinking water of 0.004 mg rotenone per liter of water (4 ppb). These proposed lifetime allowable levels for drinking water are based on applying a 1,000-fold safety factor to the chronic feeding study of Ellis et al. (1980). These levels assume a lifetime of exposure to rotenone. For comparison, most rotenone treatments are done within the range of 0.025–0.25 mg rotenone per liter of water (25–250 ppb), and rotenone generally persists for no longer than a few weeks. In addition, rotenone treatments are only infrequently applied to any body of water.

Q. Is there any short-term danger associated with accidentally drinking rotenone-treated water?
A. The hazard associated with drinking water containing rotenone is very small because of the low concentration of rotenone used in the treatment (0.025–0.25 mg of rotenone per liter of water [25–250 ppb]) and the rapid breakdown of rotenone. Estimates on a single lethal dose to humans are 300–500 mg of rotenone per kilogram of body weight (Gleason et al. 1969). Hence, a 160-pound person would have to drink over 87,000 liters (23,000 gallons) of water treated at 0.25 mg of rotenone per liter of water (highest allowable treatment rate for fish management) at one sitting to receive a lethal dose; similarly, it is extremely unlikely that a 10- kilogram child would drink over 5,400 liters of water. An intake of 0.7 mg of rotenone per kilogram of body

weight per day is considered safe (Haley 1978), far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water.

Q. Can rotenone-treated water be used for public consumption or irrigation of crops?

A. Tolerances for rotenone in potable and irrigation water have not been established by USEPA, even though the studies required for setting tolerances have been completed. This does not mean that rotenone concentrations in drinking or irrigation waters will create problems, it just means that the USEPA has not established rotenone tolerances at the time of writing these guidelines. As a result, water containing residues of rotenone cannot be legally allowed for use as a domestic water source or on crops. During the treatment and for the period of time that rotenone residues are present, alternative water sources must be used for domestic and irrigation uses. Depending on initial rotenone concentration and environmental factors (e.g., temperature), this period can vary from 1 to 8 weeks (CDFG 1994; Finlayson and J. Harrington, unpublished data, presented at Chemical Rehabilitation Projects Symposium, Bozeman, Montana, 1991).

Q. Are there any risks to human health from materials in the liquid rotenone formulations?

A. The USEPA (1981b, 1989b) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The California Environmental Protection Agency found that adverse impacts from properly conducted, legal uses of liquid rotenone formulations in prescribed fish management projects were nonexistent or within acceptable levels (memorandum from J. Wells, California Department of Pesticide Regulation, to Finlayson, 3 August 1993). Liquid rotenone contains the carcinogen trichloroethylene (TCE). However, the TCE concentration in water immediately following treatment (less than 0.005 mg TCE per liter of water [5 ppb]) is within the level permissible in drinking water (0.005 mg TCE per liter of water; USEPA 1980b). None of the other materials including xylenes, naphtha- lene, piperonyl butoxide, and methylnaphthalenes exceed any water quality criteria or guidelines (based on lifetime exposure) set by the USEPA (1980a, 1981a, 1993). Many of these materials in the liquid rotenone formulations (trichloroethylene, naphthalene, and xylene) are the same as those found in fuel oil and are present in waters everywhere because of the frequent use of outboard motors.

Q. Is there any risk to public health from airborne rotenone?

A. No public health effects from rotenone use as a piscicide have been reported. The use of the powder Pro-Noxfish® and the liquid formulation Nusyn-Noxfish® have been monitored for airborne drift into adjacent areas. Airborne rotenone concentrations immediately adjacent to the treatment site, monitored in California during a treatment in 1997, varied from a high of 0.02 ppb rotenone (0.00053 mg of rotenone per cubic meter) immediately after application to nondetectable levels two weeks later (CARB 1997). The highest levels were approximately 1,000-fold lower than the estimated no observed effect level (NOEL) of 0.43 mg of rotenone per cubic meter of air for a 24-hour period estimated by the California Office of Environmental Health and Hazard Assessment and the California Department of Pesticide Regulation (CARB 1997). In the same monitoring program, TCE was detected only once at a trace amount in air at one spillway. The heavier hydrocarbons (naphthalene and methylnaphthalene) were found at 281

ppb (1.74 mg per cubic meter) in air immediately after treatment and diminished to 1.61 ppb (0.010 mg per cubic meter) in air within two weeks. Individuals can normally detect naphthalene and methylnaphthalene at levels between 40 and 84 ppb in the air. The highest levels of all materials in the 1997 monitoring program were found at a dam spillway because of water turbulence. The highest levels were determined not to be responsible for any health effects (CDPR 1998).

Q. How soon can people safely enter water treated with rotenone?

A. The USEPA (1981b) concluded that there was no reason to restrict the use of rotenone in waters intended for irrigation, livestock (with the possible exception of swine) consumption, and recreational swimming use. The USEPA (1990) ruled that a reentry interval was not needed for persons who swim in waters treated with rotenone based on an assessment of the toxicology data (e.g., skin, oral water intake) and exposure level. The reentry statement on the product labels—"do not swim in rotenone treated water until the application has been completed and all the pesticide has been thoroughly mixed into the water according to labeling instructions" — indicates the safety of rotenone use for fish control. The reason for this slight waiting period is esthetic.

Q. Are people at risk from consuming fish stocked into a recently treated water body?

A. Fish are not stocked into a treated area until all of the toxic effects are gone and rotenone has dissipated. Hence, stocked fish cannot accumulate residues of rotenone from the water. Residues of rotenone in tolerant fish that survive a rotenone treatment won't last for more than several days because the bioaccumulation potential for rotenone is low and the half-life of rotenone in fish is about 1 day (Gingerich and Rach 1985; Gingerich 1986).

Q. Is there any risk to people from consuming fish that have been killed from rotenone?

A. The USEPA has not established guidelines for consuming fish killed with rotenone. Therefore, agencies cannot condone this practice. Additionally, there is a valid concern of risk of salmonella and other bacteriological poisoning from consuming fish that have been dead for a period of time. Fish that end up on land as a result of wave or wind action are no more a threat to public health than fish that die of natural causes.

5.3 ENVIRONMENTAL QUALITY

Q. Do dead and decaying fish pose any problems to the recovery of fishing?

A. Most dead fish will sink to the bottom of the treated body of water in several days, decompose, and release nutrients back into the water. These nutrients will directly stimulate phytoplankton and indirectly stimulate insect and zooplankton production. These organisms are a good food base for fish.

Q. Can the toxic effects of rotenone to fish and other aquatic life be neutralized?

A. In lakes or rivers, if biologists want to neutralize the effects of rotenone, potassium permanganate, an oxidizing agent, can be used. This is added to the water at a minimum 1:1 ratio with the concentration of rotenone applied plus sufficient additional permanganate to satisfy the

oxygen demand caused by organic matter that may be present in the treated water. Neutralization of rotenone with permanganate may be impaired at water temperatures of 50°F (10°C) or less (CDFG 1994; AgrEvo, no date).

Q. What is the "pesticide" smell sometimes associated with the use of rotenone?

A. The aromatic smell (like the smell of mothballs) associated with the use of liquid rotenone formulations is likely airborne concentrations (greater than 40 ppb) of naphthalene and methylnaphthalene (CDPR 1998). This smell may last for several days, depending on air and water temperatures and wind direction. These relatively "heavy" organic compounds tend to sink (remain close to the ground) and move downwind. The California Department of Pesticide Regulation (CDPR 1998) found no health effects from this smell despite complaints.

Q. How long does rotenone persist?

A. The time for natural degradation (neutralization) of rotenone by hydrolysis is governed primarily by temperature. Studies in standing, icefree waters in California show that rotenone completely degrades within 1 to 8 weeks within the temperature range of 10–20°C (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished); the estimated half-life values for California waters vary from 7.8 to 1.5 days, respectively. Other studies indicate half-life values of 13.9 hours to 10.3 days for water temperatures of 24°C and 5°C, respectively (Gilderhus et al. 1986, 1988). Rotenone dissipates in flowing waters relatively quickly (less than 24 hours) due to dilution and increased rates of hydrolysis (Borriston Laboratories 1983) and photolysis (Cheng et al. 1972; Biospherics 1982). Although rotenone can be found in lake sediments, the levels approximate those found in water, and breakdown of rotenone lags one to two weeks behind water levels. It is uncommon to find rotenone in stream sediments (CDFG 1994).

Q. How long do the materials other than rotenone persist from liquid formulation treatments?

A. Researchers in California have found other organic compounds associated with the use of the liquid formulation Nusyn-Noxfish® (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished). These include the volatile organic compounds (VOC) [xylene, trichlorethylene (TCE), toluene, and trimethylbenzene] and the semivolatile organic compounds (semiVOC) [piperonyl butoxide (PBO), naphthalene, 1-methyl naphthalene, and 2-methyl naphthalene] (Table 5.1). With the exception of PBO, the other organic compounds disappear before rotenone dissipates, typically within 1 to 3 weeks. Piperonyl butoxide, which is the other active ingredient (synergist) in Nusyn-Noxfish®, is relatively stable; photolysis does not contribute significantly to its degradation (Friedman and Epstein 1970). Piperonyl butoxide has persisted in deep lake waters at low temperatures (below 10°C) for approximately nine months. The VOC's do not accumulate in the sediment, and only naphthalene and the methyl naphthalenes temporarily (less than 8 weeks) accumulate in the sediments (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished).

Table 5.1. Persistence of rotenone and other organic compounds in water and sediment impoundments treated with 2 ppm rotenone formulation.

Compound	Initial water concentration (parts per billion)	Water persistence	Initial sediment concentration (parts per billion)	Sediment persistence
Rotenone	50	<8 weeks	522	<8 weeks
Trichloroethylene	1.4	<2 weeks	ND*	
Xylene	3.4	<2 weeks	ND	
Trimethylbenzene	0.68	<2 weeks	ND	
Naphthalene	140	<3 weeks	146	<8 weeks
1-m-naphthalene	150	<3 weeks	150	<4 weeks
2-m-naphthalene	340	<3 weeks	310	<4 weeks
Toluene	1.2	<2 weeks	ND	
Piperonyl Butoxide	30	<9 months	ND	

*ND=below detection limits

Q. Does the synergist piperonyl butoxide used in some formulations pose an environmental risk?

A. No, piperonyl butoxide has little toxicity to fish and wildlife and is not a risk to humans at the concentrations used in fish management (Roussel Bio Corporation, no date).

Q. Is rotenone likely to enter groundwater and pollute water supplies?

A. The ability of rotenone to move through soil is low to slight. Rotenone moves only 2 cm (<1 inch) in most types of soils. An exception would be in sandy soils where the movement is about 8 cm (slightly more than 3 inches). Rotenone is strongly bound to organic matter in soil so it is unlikely that rotenone would enter groundwater (Dawson et al. 1991). The other compounds in the liquid formulation Nusyn-Noxfish® have not been detected in groundwaters (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished).

Q. Are there any degradation products from rotenone that can cause environmental problems?

A. The metabolite of rotenone, rotenolone, persists longer than rotenone, especially in cold, alpine lakes (Finlayson and Harrington, unpublished). Rotenolone has been detected for as long as 6 weeks in cool water temperatures (<10°C) at high elevations (>8,000 feet). In part, this situation occurs because rotenone may be more susceptible to photolysis than rotenolone. However, studies have indicated that rotenolone is approximately one-tenth as lethal as rotenone (CDFG 1991a). In those rare cases of rotenolone persistence, fish stocking would be delayed until both rotenone and rotenolone residues have declined to nondetectable (<2 ppb) levels to err on the side of safety.

5.4 FISH AND WILDLIFE

Q. Does rotenone affect all aquatic animals the same?

A. No. Fish are more susceptible. All animals including fish, insects, birds, and mammals have natural enzymes in the digestive tract that neutralize rotenone, and the gastrointestinal absorption of rotenone is inefficient. However, fish (and some forms of amphibians and aquatic invertebrates) are more susceptible because rotenone is readily absorbed directly into their blood through their gills (non-oral route) and thus, digestive enzymes cannot neutralize it. Contrary to common belief, the other ingredients in Noxfish® and Nusyn-Noxfish® impart no toxicity to fish, insects, birds, or mammals (CDFG 1994). Rotenone residues in dead fish are generally very low (<0.1 ppm), unstable like those in water, and not readily absorbed through the gut of the animal eating fish.

Q. Will wildlife that eat dead fish and drink treated water be affected?

A. For the reasons listed above, birds and mammals that eat dead fish and drink treated water will not be affected. A bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within 24 hours to receive a lethal dose. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily; thus, a safety factor of 1,000- to 10,000-fold exists for birds and mammals. No latent or continuing toxicity is expected since under normal conditions rotenone will not persist for more than a few weeks (CDFG 1994).

Q. Will wildlife species be affected by the loss of their food supply following a rotenone treatment?

A. During recent treatments in California, fish-eating birds (i.e., herons and sea gulls) and mammals (i.e., raccoons) were found foraging on dying and recently dead fish for several days following treatment (CDFG 1994). Following this abundance of dead fish, a temporary reduction in food supplies for fish- or invertebrate-eating birds and mammals will result until the fish and invertebrates are restored. There is no indication that this temporary reduction results in any significant impacts to most bird or mammal populations because most animals can utilize other water bodies and sources for food. However, the temporary loss in food resources for sensitive animals during mating may cause unavoidable impacts. California has mitigated an impact to nesting bald eagles during mating by removing their eggs from the nest to an approved eagle recovery program out of the area (CDFG 1991b). Likewise, Michigan has mitigated the impacts to loons by delaying treatments until chicks have fledged.

Q. Is it safe for livestock to drink from rotenone-treated waters?

A. Rotenone was used for many years to control grubs on the backs of dairy and beef cattle. The USEPA (1981b) has stated that there is no need to restrict livestock consumption of treated waters. However, swine are more sensitive to rotenone than cattle (Thomson 1985).

5.5 REFERENCES

AgrEvo. No date. Nusyn-Noxfish stream and river monograph. AgrEvo Environmental Health, Montvale, New Jersey.

Biospherics. 1982. Aqueous photodegradation of 14C-rotenone. Report to U.S. Geological Service, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study 14-16-990-81-042), La Crosse, Wisconsin.

Biotech Research. 1981. Analytical studies for detection of chromosomal aberrations in fruit flies, rats, mice and horse bean. Report to U.S. Geological Service, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study 14-16-990-80-54), La Crosse, Wisconsin.

Borriston Laboratories. 1983. Hydrolysis of 14C-rotenone. Report to U.S. Geological Service, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study), La Crosse, Wisconsin.

CARB (California Air Resources Board). 1997. Lake Davis fish kill emergency response—final report. CARB, Sacramento.

CDFG (California Department of Fish and Game). 1991a. Pesticide investigations unit, aquatic toxicology laboratory 1990 annual progress report. CDFG, Environmental

Services Division, Sacramento.
CDFG (California Department of Fish and Game). 1991b. Northern pike eradication project - draft subsequent environmental impact report. CDFG, Inland Fisheries Division, Sacramento.
CDFG (California Department of Fish and Game). 1994. Rotenone use for fisheries management - final programmatic environmental impact report (SCH 92073015). CDFG, Environmental Services Division, Sacramento.
CDPR (California Department of Pesticide Regulation). 1998. A report on the illnesses related to the application of rotenone to Lake Davis. CDPR, Worker Health and Safety Branch, Report HS-1772, Sacramento.
Chandler, J., and L. Marking. 1982. Toxicity of rotenone to selected aquatic invertebrates and frog larvae. Progressive Fish-Culturist 44:78-80.
Cheng, H., I. Yamamoto, and J. Casida. 1972. Rotenone photodecomposition. Journal of Agricultural Food Chemistry 20:850-856.
Dawson, V. K., W. H. Gingerich, R. A. Davis, and P. A. Gilderhus. 1991. Rotenone persistence in freshwater ponds: effects of temperature and sediment adsorption. North American Journal of Fisheries Management 11:226-231.
Ellis, H., and six coauthors. 1980. Subchronic oral dosing study for safety evaluation of rotenone using dogs. Report to U.S. Geological Service, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study 14-16-009-79-115), La Crosse, Wisconsin.
Friedman, M. A., and S. S. Epstein. 1970. Stability of piperonyl butoxide. Toxicology and Applied Pharmacology 17: 810-812.
Gilderhus, P. A., J. L. Allen, and V. K. Dawson. 1986. Persistence of rotenone in ponds at different temperatures. North American Journal of Fisheries Management 6:126-130.
Gilderhus, P. A., V. K. Dawson, and J. L. Allen. 1988. Deposition and persistence of rotenone in shallow ponds during cold and warm seasons. U.S. Fish and Wildlife Service, Investigations in Fish Control 95.
Gingerich, W. 1986. Tissue distribution and elimination of rotenone in rainbow trout. Aquatic Toxicology 8:27-40.
Gingerich, W., and J. Rach. 1985. Uptake, accumulation and depuration of 14C-rotenone in bluegills (*Lepomis macrochirus*). Aquatic Toxicology 6:170-196.
Gleason, M., R. Gosselin, H. Hodge, and P. Smith. 1969. Clinical toxicology of commercial products. The William and Wilkins Company, Baltimore, Maryland.
Goethem, D., B. Barnhart, and S. Fotopoulos. 1981. Mutagenicity studies on rotenone. Report to U.S. Geological Service, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study 14-16-009-80-076), La Crosse, Wisconsin.
Haley, T. 1978. A review of the literature of rotenone. Journal of Environmental Pathology and Toxicology 1:315-337.
Hazleton Raltech Laboratories. 1982. Teratology study with rotenone in rats. Report to U.S. Geological Service, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study 81178), La Crosse, Wisconsin.
Marking, L., and T. Bills. 1976. Toxicity of rotenone to fish on standardized laboratory tests. U.S. Fish and Wildlife Service, Investigations in Fish Control, Bulletin 72.
NAS (National Academy of Science). 1983. Drinking water and health, volume 5. Safe

Drinking Water Committee Board of Toxicology and Environmental Health Hazards, Commission on Life Sciences, National Research Council, National Academy Press, Washington, D.C.

Oberg, K. 1967a. On the principal way of attack of rotenone in fish. Archives for Zoology 18:217-220.

Oberg, K. 1967b. The reversibility of the respiration inhibition in gills and the ultrastructural changes in chloride cells from rotenone-poisoned marine teleost, *Gaduscallarius*. Experimental Cellular Research 45:590-602.

Roussel Bio Corporation. No date. Technical information sheet piperonyl butoxide insecticidal syngerist. Roussel Bio Corporation, Montvale, New Jersey.

Siepmann, S., and B. Finlayson. 1999. Chemical residues in water and sediment following rotenone application to Lake Davis, California. California Department of Fish and Game, Office of Spill Prevention and Response Administrative Report 99-2, Sacramento.

Spencer, F., and L. Sing. 1982. Reproductive responses to rotenone during decidualized pseudogestation and gestation in rats. Bulletin of Environmental Contamination and Toxicology 228:360-368.

Thomson, W. T. 1985. Agricultural chemicals, book 1: insecticides, acaracides and ovicides. Thomson Publications, Fresno, California.

Tisdel, M. 1985. Chronic toxicity study of rotenone in rats. Report to U.S. Geological Survey, Upper Midwest Environmental Sciences Center (U.S. Fish and Wildlife Service Study 6115-100), La Crosse, Wisconsin.

USEPA (U.S. Environmental Protection Agency). 1980a. Ambient water quality criteria for naphthalene. USEPA Document 440/5-80-059, Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1980b. Ambient water quality criteria trichloroethylene. USEPA Document 440/5-80-077, Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1981a. Advisory option for xylenes (dimethylbenzene). USEPA, Office of Drinking Water, Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1981b. Completion of pre-RPAR review of rotenone. USEPA, Office of Toxic Substances (June 22, 1981), Washington D.C.

USEPA (U.S. Environmental Protection Agency). 1989b. Guidance for the reregistration of pesticide products containing rotenone and associated resins as the active ingredient. USEPA Report 540/RS-89-039, Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1990. Rotenone re-entry statement for swimmers. USEPA Administrative 6704-Q, (January 17, 1990), Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1993. Water quality standards handbook. USEPA Report

(EPA-823-B-93-002), Water Quality Standards Branch, Office of Science and Technology (September
1993), Washington, D.C.

Front Panel

RESTRICTED USE PESTICIDE
DUE TO AQUATIC AND ACUTE INHALATION TOXICITY
For retail sale to, and use only by, Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.

PRENFISH TOXICANT

Liquid Emulsifiable

*For Control of Fish in Lakes, Ponds, Reservoirs and Streams

ACTIVE INGREDIENTS:

Rotenone	5.0%
Other Associated Resins	5.0%
INERT INGREDIENTS*:	90.0%
TOTAL	100.0%

*This product contains aromatic hydrocarbons.

PRENTOX® - Registered Trademark of Prentiss Incorporated

KEEP OUT OF REACH OF CHILDREN

DANGER - POISONOUS

See inside booklet for additional precautionary statements.

FIRST AID
Have product container or label with you when obtaining treatment advice.

If swallowed	• Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice. • Do not induce vomiting unless told to do so by the Poison Control Center or physician. • Do not give **any** liquid to the person. • Do not give anything by mouth to an unconscious or convulsing person.
If inhaled	• Remove victim to fresh air. • If not breathing, give artificial respiration, preferably mouth-to-mouth. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.
If in eyes	• Hold eyelids open and rinse slowly and gently with water for 15-20 minutes. • Remove contacts, if present, after the first 5 minutes, then continue rinsing eye. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.

For information on this pesticide product (including health concerns, medical emergencies, or pesticide incidents), call the National Pesticide Information Center at 1-800-858-7378.

EPA Reg. No. 655-422 9/02 EPA Est. No. 655-GA-1

Manufactured by:

PRENTISS INCORPORATED
Plant: Kaolin Road, Sandersville, GA 31082
Office: C.B. 2000, Floral Park, NY 11002-2000

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
DANGER

Fatal if inhaled. May be fatal if swallowed. Harmful if absorbed through skin. Causes substantial but temporary eye injury. Causes skin irritation. Do not breathe spray mist. Do not get in eyes, on skin or on clothing. Wear goggles or safety glasses. When working with undiluted product, wear either a respirator with an organic-vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix 14G), or a NIOSH approved respirator with an organic vapor (OV) cartridge or canister with any R, P or HE prefilter. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

This pesticide is extremely toxic to fish. Fish kills are expected at recommended rates. Consult your State Fish and Game Agency before applying this product to public waters to determine if a permit is needed for such an application. Do not contaminate untreated water when disposing of equipment washwaters.

CHEMICAL AND PHYSICAL HAZARDS

FLAMMABLE: KEEP AWAY FROM HEAT AND OPEN FLAME. FLASH POINT MINIMUM 45° F (7° C).

SPECIMEN

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Storage: Store only in original containers, in a dry place inaccessible to children and pets. Prentox Prenfish Toxicant will not solidify nor show any separation at temperatures down to 40°F and is stable for a minimum of one year when stored in sealed drums at 70°F.

Pesticide Disposal: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions contact your state pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

General Information

Prentox Prenfish Toxicant is a specially formulated product containing rotenone, to be used in fisheries management for the eradication of fish from lakes, ponds, reservoirs and streams.

Since such factors as pH, temperature, depth and turbidity will change effectiveness, use this product only at locations, rates, and times authorized and approved by appropriate state and federal fish and wildlife agencies. Rates must be within the range specified on the label.

Properly dispose of unused product. Do not use dead fish for food or feed. Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir.

Re-entry Statement: Do not allow swimming in rotenone-treated water until the application has been completed and all pesticide has been thoroughly mixed into the water according to labeling instructions.

For Use in Ponds, Lakes and Reservoirs

The actual application rates and concentrations of rotenone needed to control fish will vary widely, depending on the type of use (e.g., selective treatment, normal pond use, etc.) and the factors listed above. The table below is a general guide for the proper rates and concentrations.

Prentox Prenfish Toxicant disperses readily in water both laterally and vertically, and will penetrate below the thermocline in thermally stratified bodies of water.

Computation of Acre-Feet: An acre-foot is a unit of volume of a body of water having the area of one acre and the depth of one foot. To determine acre feet in a given body of water, make a series of transects across the body of water taking depths with a measured pole or weighted line. Add the soundings and divide by the number made to determine the average depth. Multiply this average depth by the total surface area in order to determine the acre feet to be treated. If number of surface acres is unknown, contact your local Soil Conservation Service, which can determine this from aerial photographs.

Amount of Prentox Prenfish Toxicant Needed for Specific Uses: To determine the approximate number of gallons of Prentox Prenfish Toxicant (5.0% Rotenone) needed, find your "Type of Use" in the first column of the table below and then divide the corresponding numbers in the forth column, "Number of Acre-Feet Covered by One Gallon" into the number of acre-feet in your body of water.

General Guide to the Application Rates and Concentrations of Rotenone Needed to Control Fish in Lakes, Ponds and Reservoirs[1]

Type of Use	Parts Per Million		Number of Acre-Feet Covered by One Gallon
	Prenfish Toxicant	Active Rotenone	
Selective Treatment	0.10 to 0.13	0.005 to 0.007	30 to 24
Normal Pond Use	0.5 to 1.0	0.025 to 0.050	6.0 to 3.0
Remove bullheads or carp	1.0 to 2.0	0.050 to 0.100	3.0 to 1.5
Remove bullheads or carp in rich organic ponds	2.0 to 4.0	0.100 to 0.200	1.5 to 0.75
Preimpoundment treatment above dam	3.0 to 5.0	0.150 to 0.250	1.0 to 0.60

[1] Adapted from Kinney, Edward. 1965. Rotenone in Fish Pond Management. USDI Washington, D.C. Leaflet FL-576.

Pre-Mixing and Method of Application: Pre-mix with water at a rate of one gallon Prentox Prenfish Toxicant to 10 gallons of water. Uniformly apply over water surface or bubble through underwater lines.

Detoxification: Prentox Prenfish Toxicant treated waters detoxify under natural conditions within one week to one month depending upon temperatures, alkalinity, etc. Rapid detoxification can be accomplished by adding chlorine or potassium permanganate to the water at the same rate as Prentox Prenfish Toxicant in parts per million, plus enough additional to meet the chlorine demand of the untreated water.

Removal of Taste and Odor: Prentox Prenfish Toxicant treated waters do not retain a detectable taste or odor for more than a few days to a maximum of one month. Taste and odor can be removed immediately by treatment with activated charcoal at a rate of 30 ppm for each 1 ppm Prentox Prenfish Toxicant remaining. (Note: As Prentox Prenfish Toxicant detoxifies, less charcoal is required.)

Restocking After Treatment: Wait 2 to 4 weeks after treatment. Place a sample of fish to be stocked in wire cages in the coolest part of the treated waters. If the fish are not killed within 24 hours, the water may be restocked.

Use in Streams Immediately Above Lakes, Ponds and Reservoirs

The purpose of treating streams immediately above lakes, ponds and reservoirs is to improve the effectiveness of lake, pond and reservoir treatments by preventing target fish from moving into the stream corridors, and not to control fish in streams per se. The term "immediately" means the first available site above the lake, pond or reservoir where treatment is practical, while still creating a sufficient barrier to prevent migration of target fish into the stream corridor.

In order to completely clear a fresh water aquatic habitat of target fish, the entire system above or between fish barriers must be treated. See the use directions for streams and rivers on this label for proper application instructions.

In order to treat a stream immediately above a lake, pond or reservoir you must: (a) select the concentration of active rotenone, (b) compute the flow rate of the stream, (c) calculate the application rate, (d) select an exposure time, (e) estimate the amount of product needed, (f) follow the method of application. To prevent movement of fish from the pond, lake or reservoir, stream treatment should begin before and continue throughout treatment of the pond, lake or reservoir until mixing has occurred.

1. Concentration of Active Rotenone

Select the concentration of active rotenone based on the type of use from those listed on the table. Example: If you select "normal pond use" you could select a concentration of 0.025 part per million.

2. Computation of Flow Rate for Stream

Select a cross section of the stream where the banks and bottom are relatively smooth and free of obstacles. Divide the surface width into 3 equal sections and determine the water depth and surface velocity at the center of each section. In slowly moving streams, determine the velocity by dropping a float attached to 5 feet of loose monofilament fishing line. Measure the time required for the float to move 5 feet. For fast-moving streams, use a longer distance. Take at least three readings at each point. To calculate the flow rate from the information obtained above, use the following formula:

$$F = \frac{Ws \times D \times L \times C}{T}$$

Where F = flow rate (cubic feet/second), Ws = surface width (feet), D = mean depth (feet), L = mean distance traveled by float (feet), C = constant (0.8 for rough bottoms and 0.9 for smooth bottoms), and T = mean time for float (sec.).**3.**

Calculation of Application Rate

In order to calculate the application rate (expressed as gallons/second), you convert the rate in the table (expressed as gallons/acre-feet), to gallons per cubic feet and multiply by the flow rate (expressed as cubic feet/second). Depending on the size of the stream and the type of equipment, the rate could be expressed in other units, such as ounces/hour, or cc/minute.

The application rate for the stream is calculated as follows:

$$R_s = R_p * C * F$$

where R_s = application rate for stream (gallons/second), R_p = application rate for pond (gallons/acre-feet), C = 1 acre foot/43560 cubic feet, and F = flow rate of the stream (cubic feet/second).

4. Exposure Time

The exposure time would be the period of time (expressed in hours or minutes) during which Prentox Prenfish Toxicant is applied to the stream in order to prevent target fish from escaping from the pond into the stream corridor.

5. Amount of Product

Calculate the amount of product for a stream by multiplying the application rate for streams by the exposure time.

$$A = R_s * H$$

where A = the amount of product for the stream application, R_s = application rate for stream (gallons/second), and H = the exposure time expressed in seconds.

For use in Streams and Rivers

Only state or federal Fish and Wildlife personnel or professional fisheries biologists under the authorization of state or federal Fish and Wildlife Agencies are permitted to make applications of Prentox Prenfish Toxicant for control of fish in streams and rivers. Informal consultation with Fish and Wildlife personnel regarding the potential occurrence of endangered species in areas to be treated should take place. Applicators must reference Prentiss Incorporated's Prentox Prenfish Toxicant Stream and River Use Monograph before making any application to streams or rivers.

DRAFT

Warranty Statement: Our recommendations for the use of this product are based upon tests believed to be reliable. The use of this product being beyond the control of the manufacturer, no guarantee, expressed or implied, is made as to the effects of such or the results to be obtained if not used in accordance with directions or established safe practice. The buyer must assume all responsibility, including injury or damage, resulting from its misuse as such, or in combination with other materials.

PRENTOX® PRENFISH TOXICANT STREAM AND RIVER USE MONOGRAPH
USE IN STREAMS AND RIVERS

The following use directions are to provide guidance on how to make applications of Prentox Prenfish Toxicant to streams and rivers. The unique nature of every application site could require minor adjustments to the method and rate of application. Should these unique conditions require major deviation from the use directions, a Special Local Need 24(c) registration should be obtained from the state.

Before applications of Prentox Prenfish Toxicant can be made to streams and rivers, authorization must be obtained from state or federal Fish and Wildlife agencies. Since local environmental conditions will vary, consult with the state Fish and Wildlife agency to ensure the method and rate of application are appropriate for that site.

Contact the local Water Department to determine if any water intakes are within one mile down flow of the section of stream, river or canal to be treated. If so, coordinate the application with the water department to make sure the intakes are closed during treatment and detoxification.

Application Rates and Concentration of Rotenone

Slow Moving Rivers: Apply rotenone as a drip for 4 to 8 hours to the flowing portion of the stream. Multiple application sites are used along the length of the treated stream, spaced approximately 1/2 to 2 miles apart depending on the water flow travel time between sites. Multiple sites are used because rotenone is diluted and detoxified with distance. Application sites are spaced at no more than 2 hours or at no less than 1 hour travel time intervals. This assures that the treated stream remains lethal to fish for a minimum of 2 hours. A non-toxic dye such as Rhodamine-WT® or fluorescein can be used to determine travel times. Cages containing live fish placed immediately upstream of the downstream application sites can be used as sentinels to assure that lethal conditions exist between sites.

Apply rotenone at each application site at a concentration of 0.25 to 1.0 part per million of Prentox Prenfish Toxicant. The amount of Prentox Prenfish Toxicant needed at each site is dependent on stream flow (see Computation of Flow Rate for Stream).

Application of Undiluted Material

Prentox Prenfish Toxicant can drain directly into the center of the stream at a rate of 0.85 to 2.4 cc per minute for each cubic foot per second of stream flow. Flow of undiluted Prentox Prenfish Toxicant into the stream should be checked at least hourly. This is equivalent to from 0.25 to 1.0 ppm Prentox Prenfish Toxicant, or from 0.012 to 0.050 ppm rotenone. Back-water, stagnant and spring areas of streams should be sprayed by hand with a 10% v/v solution of Prentox Prenfish Toxicant in water to assure a complete coverage.

Calculation of Application Rate:

$$X = F(1.69\ B)$$

X = cc per minute of Prentox Prenfish Toxicant applied to the stream, F = the flow rate (cu. ft./sec.) see Computation of Flow Rate for Stream section of the label, B = parts per million desired concentration of Prentox Prenfish Toxicant.

Total Amount of Product Needed for Treatment: Streams should be treated for 4 to 8 hours in order to clear the treated section of stream of fish. To determine the total amount of Prentox Prenfish Toxicant required use the following equation:

$$Y = X(0.0158\ C)$$

Y = gallons of Prentox Prenfish Toxicant required for the stream treatment, X = cc per minute of Prentox Prenfish Toxicant applied to the stream, C = time in hours of the stream treatment.

Application of Diluted Material

Alternatively, for stream flows up to 25 cubic feet per minute, continuous drip of diluted Prentox Prenfish Toxicant at 80 cc per minute can be used. Flow of diluted Prentox Prenfish Toxicant into the stream should be checked at least hourly. Use a 5 gallon reservoir over a 4 hour period, a 7.5 gallon reservoir over a 6 hour period, or a 10 gallon reservoir over an 8 hour period. The volume of the reservoir can be determined from the equation:

$$R = H * 1.25$$

where R = the volume of the reservoir in gallons, and H = the duration of the application in hours.

The volume of Prentox Prenfish Toxicant diluted with water in the reservoir is determined from the equation:

$$X = Y(102\ F)H$$

where X = the cc of Prentox Prenfish Toxicant diluted in the reservoir, Y = parts per million desired concentration of Prentox Prenfish Toxicant, F = the flow rate (cubic feet/second), H = the duration of the application (hours).

For flows over 25 cubic feet per minute, additional reservoirs can be used concurrently. Back-water, stagnant and spring areas of streams should be sprayed by hand with a 10% v/v solution of Prentox Prenfish Toxicant in water to assure a complete coverage.

Detoxification

To limit effects downstream, detoxification with potassium permanganate can be used at the downstream limit of the treated area. Within 1/2 to 2 miles of the furthest downstream Prentox Prenfish Toxicant application site, the rotenone can be detoxified with a potassium permanganate solution at a resultant stream concentration of 2 to 4 parts per million, depending on rotenone concentration and permanganate demand of the water. A 2.5% (10 pounds potassium permanganate to 50 gallons of water) permanganate solution is dripped in at a continuous rate using the equation:

$$X = Y(70\ F)$$

where X = cc of 2.5% permanganate solution per minute, Y = ppm of desired permanganate concentration, and F = cubic feet per second of stream flow.

Flow of permanganate should be checked at least hourly. Live fish in cages placed immediately above the permanganate application site will show signs of stress signaling the need for beginning detoxification. Detoxification can be terminated when replenished fish survive and show no signs of stress for at least four hours.

Detoxification of rotenone by permanganate requires between 15 to 30 minutes contact time (travel time). Cages containing live fish can be placed at these downstream intervals to judge the effectiveness of detoxification. At water temperature of less than 50° F detoxification may be retarded, requiring a longer contact time.

SAMPLE

Adhesive Panel

RESTRICTED USE PESTICIDE
DUE TO AQUATIC AND ACUTE INHALATION TOXICITY
For retail sale to, and use only by, Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.

PRENFISH TOXICANT

Liquid Emulsifiable

*For Control of Fish in Lakes, Ponds, Reservoirs and Streams

ACTIVE INGREDIENTS:	
Rotenone	5.0%
Other Associated Resins	5.0%
INERT INGREDIENTS*:	90.0%
TOTAL	100.0%

*This product contains aromatic hydrocarbons.

PRENTOX® - Registered Trademark of Prentiss Incorporated

KEEP OUT OF REACH OF CHILDREN

DANGER - POISONOUS

See inside booklet for additional precautionary statements.

FIRST AID

Have product container or label with you when obtaining treatment advice.

If swallowed	• Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice. • Do not induce vomiting unless told to do so by the Poison Control Center or physician. • Do not give **any** liquid to the person. • Do not give anything by mouth to an unconscious or convulsing person.
If inhaled	• Remove victim to fresh air. • If not breathing, give artificial respiration, preferably mouth-to-mouth. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.
If in eyes	• Hold eyelids open and rinse slowly and gently with water for 15-20 minutes. • Remove contacts, if present, after the first 5 minutes, then continue rinsing eye. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.

For information on this pesticide product (including health concerns, medical emergencies, or pesticide incidents), call the National Pesticide Information Center at 1-800-858-7378.

EPA Reg. No. 655-422 9/02 EPA Est. No. 655-GA-1

Manufactured by:

PRENTISS INCORPORATED
Plant: Kaolin Road, Sandersville, GA 31082
Office: C.B. 2000, Floral Park, NY 11002-2000

SPECIMEN

Material Safety Data Sheet
U.S. Department of Labor (OSHA 29 CFR 1910.1200)

Manufacturer's Name: **Prentiss Incorporated**
C. B. 2000
Floral Park, NY 11001
Telephone Number: **(516) 326-1919**

Section 1: Chemical Identification

Product: 655-422 **Prentox® Prenfish™ Toxicant**
EPA Signal Word: DANGER

Active Ingredient (%):	Rotenone (5%)	(CAS # 83-79-4)
	Other Cube Resins (10%)	N/A
Chemical Names:	Rotenone – N/A	
Chemical Class:	Mixture	

Section 2: Composition/ Information 0n Ingredients

Material:	OSHA PEL	ACGIH TLV	Other	NTP/IARC/OSHA Carcinogen
Rotenone	(TWA) 5 mg/ M^3	(STEL) 10 mg/M^3 (TWA) 5 mg/M^3		No/No/No
Other associated cube resins	Not Est.	Not Est.		
Aromatic Petroleum Solvent (Supplier recommendation 100 ppm) (CAS # 64742-94-5) (Not to exceed 80%)				
Contains the following ingredients, by weight (typical):				
Naphthalene (CAS # 91-20-3)		9.9%	(TWA) 10 ppm	
1,2,4-trimethylbenzene (CAS # 95-63-6)		1.7%	(TWA) 25 ppm	
Acetone (CAS # 67-64-1) (not to exceed 7.5%)			(TWA) 250 ppm	
Emulsifier #1 (CAS # N/A)		1.5%	N/D	
Emulsifier #2 (CAS # N/A)		4.5%	N/D	

Section 3: Hazards Identification

Clear liquid with mild odor. Fatal if inhaled. May be fatal if swallowed. Harmful if absorbed through skin. Causes substantial but temporary eye injury. Causes skin irritation. This pesticide is extremely toxic to fish.

Potential Health Effects:
Primary Routes of Entry: Inhalation, ingestion, skin and eye contact.

Health Hazards (Acute and Chronic): Causes mucous membrane irritation. Chronic exposure can cause damage to liver and/or kidneys. May be fatal if swallowed. May cause eye injury. Causes skin irritation. Do not get in eyes, on skin or on clothing. Toxicity of other components: This product contains an aromatic solvent. Inhalation of solvent vapors at high concentrations are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death. Aspiration of solvent during vomiting may cause mild to severe pulmonary injury, possibly progressing to death. Frequent or prolonged skin contact may irritate and cause dermatitis. Skin contact may aggravate an existing dermatitis condition. Emulsifiers may cause severe eye injury.
Signs and Symptoms of Overexposure: Can cause skin irritation. Ingestion or inhalation can cause numbness, nausea, vomiting and tremors.
Medical Conditions Generally Aggravated by Exposure: None known.

Section 4: First Aid Measures

If swallowed, call a physician or Poison Control Center. Do not induce vomiting. This product contains aromatic petroleum solvent. Aspiration may be a hazard. Promptly drink a large quantity of milk, egg white, and gelatin solution, or if these are not available, water. Avoid alcohol.
If inhaled, remove victim to fresh air. If not breathing, administer artificial respiration, preferably by mouth to mouth. Get medical attention.
If on skin, wash with plenty of soap and water. Get medical attention if irritation persists.
If in eyes, flush eyes with plenty of water. Get medical attention if irritation persists.

Section 5: Fire Fighting Measures

Fire and Explosion

Flash Point (Method Used): 60º F. Closed cup.
Flammable Limits: LEL: 1.8 UEL: 11.7 (Solvent - approximate)
NFPA Hazard Ratings: **Health:** 3 **Flammability:** 4 **Reactivity:** 0
Extinguishing Media: CO_2, foam, dry chemical, or water spray.

Special Fire Fighting Procedures: Do not inhale smoke. Use self-contained breathing apparatus and protective clothing. This product is extremely toxic to fish, and is toxic to birds and other wildlife, prevent spread of contaminated runoff.
Unusual Fire and Explosion Hazards: When heated to decomposition, product emits acrid smoke and fumes.
Flammability Classification/Rating:
NFPA/OSHA Class: I
NFPA Rating (Fire): 4

Section 6: Accidental Release Measures

Wear protective equipment, as required, to prevent contact with product or its vapors. Cover the spilled material with generous amounts of absorbent material, such as clay, diatomaceous earth, sand or sawdust. Sweep the contaminated absorbent onto a shovel and put the sweepings into a salvage drum. Dispose of wastes as below. Place any leaking container into a similar drum or glass container. Mark the drum or container with name of product, ingredient statement, precautionary statements and signal word. Contact us for replacement label. This product is extremely toxic to fish. Fish kills are expected at recommended rates. Keep it out of lakes, streams or ponds except under use conditions.

Section 7: Handling and Storage

Do not contaminate water, food or feed by storage or disposal. Store in a dry place away from temperature extremes. Avoid inhalation of vapors. Harmful if swallowed, inhaled or absorbed through skin. Avoid contact with skin. Wear clean protective clothing.

Other precautions: Periodically inspect stored materials.

Section 8: Exposure Controls/Personal Protection

Respiratory protection: Mixers and handlers: Do not inhale. Use NIOSH certified respirator for organic vapor protection.

Ventilation:

Local Exhaust:	As required to meet TLV.
Special:	Not applicable.
Mechanical:	As required to meet TLV.
Other:	Not applicable.

Protective Gloves: Chemical resistant.

Eye Protection: Safety glasses, face shield or goggles.

Other protective clothing or equipment: Wear long pants, long sleeved shirt or other body covering clothes. Avoid skin or eye contact.

Work/Hygienic practices: Wash thoroughly after handling and before eating or smoking. Remove contaminated clothing and wash thoroughly before reuse.

Section 9: Physical and Chemical Properties

Appearance:	Amber Liquid
Odor:	Aromatic Solvent Odor
Boiling Point:	N/D
Specific Gravity (H_2O = 1):	0.9226
Vapor Pressure (mmHg):	N/D
Melting Point:	N/D
Vapor Density (Air = 1):	N/D
Evaporation Rate (Butyl Acetate = 1):	N/D
Solubility in Water:	Emulsifies.

Section 10: Stability and Reactivity

Stability:	Stable.
Conditions to avoid for stability:	None.
Incompatibility:	Strong acids and oxidizers.
Hazardous Decomposition or Byproducts:	CO, CO_2
Hazardous Polymerization:	Will not occur.
Conditions to avoid for Hazardous Polymerization:	None.

Section 11: Toxicological Information

Acute Toxicity/Irritation Studies:

(The following data were developed with Prenfish)

Ingestion:	Oral LD_{50}	55.3 mg/Kg (Rat – female) 264 mg/Kg (Rat – male) 178 mg/Kg (Rat – overall)
Dermal:		>2020 mg/Kg (Rabbit) (Slightly toxic)
Inhalation:		4-hour LC_{50} 0.048 mg/l. (Rat) (Highly toxic)
Eye Contact:		Moderately irritating (Rabbit)
Skin Contact:		Moderately irritating (Rabbit)
Skin Sensitization:		Non-sensitizing (Guinea Pig)

(The following data were developed with rotenone technical)

Mutagenic Potential: Rotenone was not mutagenic when tested.

Reproductive Hazard Potential: Rotenone had no reproductive effects when tested

Chronic/Subchronic Toxicity Studies:

Cancer Information: Rotenone was not carcinogenic when tested in rats and mice.

Toxicity of Other Components:

Petroleum solvent: The supplier reports that inhalation of high vapor concentrations (over 1,000 ppm) may cause nervous system effects such as headaches, dizziness, anesthesia and respiratory tract irritation

Surfactant: Causes severe eye irritation, which could lead to permanent eye damage. Prolonged or repeated skin contact may cause discomfort and local redness. Mist can irritate the respiratory tract, experienced as nasal discomfort and discharge with chest pain and coughing.

Target Organs: Eyes, skin, respiratory tract.

Section 12: Ecological Information

Summary of Effects: This product is extremely toxic to fish. Fish kills are expected at recommended rates. Consult your State Fish and Game Agency before applying this product to public waters to determine if a permit is needed for such an application. Do not contaminate untreated water when disposing of equipment washwaters.

Section 13: Disposal Considerations

Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities.

Section 14: Transport Information

DOT Classification: Pesticide liquid, flammable, toxic, n.o.s. (Acetone, Rotenone)
Hazard Class: 3, PG I
Subsidiary hazard class: 6.1
DOT Shipping Label: Poison and/or Toxic

Note: For transport purposes (49FR Part 173.132), the calculated 1-hour LC50 (Rat) is: 0.192 mg/L

Section 15: Regulatory Information

SARA Title III Classification:

Section 311/312:

Acute health hazard
Fire hazard

Section 313 Chemicals:

Aromatic Petroleum Solvent (Supplier recommendation 100 ppm) (CAS # 64742-94-5)
(Not to exceed 80%)
Contains the following ingredients, by weight (typical):

Naphthalene (CAS # 91-20-3)	9.9%	(TWA) 10 ppm
1,2,4-trimethylbenzene (CAS # 95-63-6)	1.7%	(TWA) 25 ppm

This product contains a toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372. Any copies or redistribution of this MSDS must include this notice.

Proposition 65: This product does not contain any chemical which is known to the State of California to cause cancer or birth defects or other reproductive harm.
CERCLA Reportable Quantity (RQ): None.
RCRA Classification: Ignitable.
TSCA Status: Registered pesticide, exempt from TSCA regulation. All ingredients are on the TSCA inventory.
Other: Rotenone

Illinois toxic substance
Massachusetts Hazardous Substance
New Jersey Special Health Hazardous Substance
Pennsylvania Workplace Hazardous Substance

Acetone

Massachusetts Hazardous Substance
New Jersey Environmental Hazardous Substance
New Jersey Special Health Hazardous Substance
New Jersey Workplace Hazardous Substance
Pennsylvania Workplace Hazardous Substance

Section 16: Other Information

NFPA Hazard Ratings:	**Health:**	3	0	Least
	Flammability:	4	1	Slight
	Reactivity:	0	2	Moderate
			3	High
			4	Severe

Date Prepared: August 10, 2000
Supersedes: February 2, 1994
Reason: Revised Format

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein.